Understanding the Recent Growth in Consumer Loans and Credit Cards in Emerging Markets

Mazibas, Murat; Tuna, Yusuf

Published in:
Emerging Markets Finance and Trade

DOI:
10.1080/1540496X.2016.1196895

Publication date:
2017

Document Version
Peer reviewed version

Understanding the Recent Growth in Consumer Loans and Credit Cards in Emerging Markets: Evidence from Turkey

Dr. Murat MAZIBAŞ[1] [2]
University of Exeter, Borsa Istanbul
muratmazibas@gmail.com

Prof. Dr. Yusuf TUNA
Istanbul Commerce University
ytuna@ticaret.edu.tr

Prepared: December 2014
Revised: May 2016
Accepted: June 2016

Abstract

In recent years, the surge in the household indebtedness to the historical heights has become a significant concern for developed economies. A similar trend has been witnessed in emerging market countries including Turkey. Our objective is to help further understanding the dynamics of the recent growth in CLCC in Turkey. For this purpose, we investigate the long-term equilibrating relationships and short-term deviations from the equilibrium, explore the determinants, directions and strengths of causality relationships between CLCC and the selected macroeconomic variables, and analyse dynamic interactions among the variables in the post-sample period by analysing how CLCC responds to the shocks given to other macroeconomic variables and the contribution of each variable on the forecast variability of CLCC. We use monthly data for the period of January 2004 – December 2013 of seven macroeconomic variables of money supply, interest rate, income, consumer confidence, inflation, stock market and consumer goods imports. On empirical findings, we make suggestions about which policy tools should be used to influence, and if necessary to manage, the growth in CLCC.

Key Words*: consumer loans, credit cards, monetary policy, ARDL models, cointegration, variance decomposition, impulse response, Granger causality, emerging markets.*

JEL Code: E51, E52, E58

---

[1] Corresponding Author. Research Fellow at the University of Exeter, UK and Head of Research & Business Development at Borsa Istanbul, Turkey.

[2] The authors greatly appreciate helpful comments of two anonymous reviewers and the editor and would like to thank them for their comments that helped significantly improve the manuscript.

1. Introduction

Households' choice of consumption and saving has one of the most prominent, longest and deepest literature in macroeconomics. The theory of consumption is central to Keynes' General Theory and has been the subject of countless theoretical and empirical studies. While Keynes' approach to consumption relies on his "knowledge of human nature", approaches following Keynes mostly are mostly based on the theory of rational choice. One of the earliest approaches was "the relative-income hypothesis" of Duesenberry (1949), which claims that a household's consumption depends not only on its current disposable income, but also on current income relative to past levels and relative to the income of other households. Although this hypothesis enjoyed popularity in early 1950s, later has given place to other, more attractive consumption models. Two other most prominent theories pioneered by Nobel laureates are "the life-cycle model" of Modigliani and Brumberg (1954) and "the permanent income hypothesis" of Friedman (1957). These two theoretical approaches were later mostly merged to become "the modern consumption theory". The theory has been further extended by the application of dynamic mathematical methods to the problem of utility maximization, by modelling of uncertainty and expectations in a rigorous way, and by developing new ways of testing the validity of intertemporal utility-maximization theory.

As the consumption is at the very heart of the macroeconomic theory, actual practices demonstrate certain problems about household consumption. The issue of rising household indebtedness has been viewed with favour by a large section of the economic profession. This favour has tended to be rationalized in the literature in terms of utility maximization behaviours. According to this view, to obtain maximum utility, households rearrange their often irregular income flows over their life to smooth consumption; to do so they utilize household debt to flatten their consumption. Therefore, household indebtedness and the factors favourable to fostering its actual growth (e.g. financial liberalisation over the past 30-35 years, easing of liquidity constraints on households) should be seen as sources of a maximum satisfaction of household needs, hence of the greatest possible advantage to the society (for a critical discussion see Barba and Pivetti, 2009).

However, rising household indebtedness over the last 30-35 years is a central concern to the developed world. In many countries, debt service as a share of household income has reached historical highs, despite last two decades have witnessed very low borrowing rates. Amongst the population of indebted households: the highest debt-to-income, debt-to-asset value and debt-service ratios are at the low and middle income households (see Debelle, 2004). Mostly cited causes of the rise in the household indebtedness are (i) financial innovation, low interest rates, availability of cheap loans, abusive and predatory lending practices (ii) change in

demographics and the distribution of income, (iii) surge in house prices and increasing use of equity withdrawal to finance consumption, (iv) financial illiteracy, and (v) wider availability of goods and services. Main consequences of higher household debt are that households are now more vulnerable to economic shocks due to high leverage, household savings are at historical lows, most households do not have adequate retirement savings, debt is used as a substitute for wages, and wealth transfer from low and mid-income segment to high-income segment, therefore increase in income inequality (see Dynan and Kohn, 2007, and Barba and Pivetti, 2009, Delgadillo et al, 2008). Increase in household indebtedness questions the sustainability of the debt levels.

Similar favourable factors are increasingly available for households of emerging economies, hence a similar trend has been witnessed in recent years. Although there is an increasing trend, the level of household indebtedness in emerging countries is still significantly lower than developed countries. While the average household debt-GDP ratio in developed economies is 80.75%, it is only 32.38% in emerging market economies in 2014.

As an emerging market economy, Turkey has positively distinguished from other emerging economies and has witnessed a very strong economic growth in the period of 2003-2014. During this period CLCC increased by 25.68 times while total loans increased by 17.26 times, and the share of CLCC in total banking loans has risen from 22 to 33%. However, household saving rates have dropped from 17.7 to 13.3% while household debt-GDP ratio has risen from 2.8 to 21.1% in the same period.

A significant increase in the wealth of average households, lower interest and inflation rates along with the availability of better financing opportunities, consumers' demands for cars, real estates and other consumer goods have increased in recent years in Turkey. Another important factor concerning the boom in consumer loans and credit cards (CLCC) is consumers' deferred consumption. With improvements in macroeconomic conditions and positive economic expectations, consumers prefer not to defer their consumption of consumer goods.

Growth in CLCC has many direct and indirect economic as well as social consequences. In recovery periods of the business cycle, through high growth and lower default rates, CLCC makes positive contributions to the economic growth. However, during an expansionary period excessive growth in CLCC may lead to inflationary pressures or to a crisis. On the other hand, in recession periods, with increases in interest rates and default rates, profitability and growth in CLCC business decelerates. While the growth in CLCC contributes to the welfare of households, especially in downturns, depending on the level of the household indebtedness, increases in defaults may end up with certain social costs.

After witnessing considerable expansion in CLCC and increase in the leverage of average household, close monitoring and, if necessary, by using monetary and fiscal policy tools, managing the growth in CLCC becomes much more critical in achieving the targets of the economic policy. Furthermore, controlling the growth in CLCC becomes much more important if a business cycle is in a downturn period and increases in defaults threaten macroeconomic and financial stability. In recent years, controlling the expansion of the CLCC has become an important priority of monetary, fiscal and banking authorities. Therefore, close monitoring of the growth in CLCC and, if necessary, intervening its expansion requires coordinated working of the authorities. The fast growth in household indebtedness mostly due to growth in CLCC calls for economic agents to better understand the dynamics of the CLCC growth and its relationships with other macroeconomic variables by employing econometric methods and models.

The main objective of this study is to help further understanding the dynamics of the recent growth in consumer loans and credit cards in Turkey. To do so, we investigate and model the long-term equilibrating relationships and short-term deviations from the equilibrium, explore the determinants, directions and strengths of causality relationships between CLCC and the selected macroeconomic variables, and analyse dynamic interactions among the variables in the post-sample period by analysing how CLCC responds to the shocks given to other macroeconomic variables and the contribution of each variable on the forecast variability of CLCC.

In this article, we analyse many different dimensions of the relationships between CLCC and other variables in order to make suggestions on the economic policy instruments which may be used to predict, influence and, if necessary, to manage the growth in CLCC. To do so, we analyse macroeconomic variables (i.e. income, interest rate, stock market, money supply, consumer goods imports, consumer confidence and inflation), which may theoretically have direct or indirect relationship with CLCC.

In order to investigate the dynamics of the relationships between CLCC and other macroeconomic variables, we first test for stationarity and structural breaks in the data. Second, we employ cointegration analysis to understand the short-term and long-term dynamics between selected macroeconomic variables. Third, we explore causality relations between CLCC and selected macroeconomic variables by employing the Granger Causality Test. Fourth, we explore the predicted responses of CLCC to the shocks (impulses) in other macroeconomic variables. Finally, we decompose the forecast error variance to better understand the contribution of each variable in forecasting CLCC.

In the literature, there are studies that investigate determinants of bank loans. Bertola *et al.* (2006) discuss the economics of consumer credit by focusing on the theoretical aspects of the demand for consumer credits. Ibicioğlu and Karan (2012) analyse determinants of mortgage loans in Turkey. They investigate the relationship between mortgage loans and interest rate, unemployment and consumer confidence. Uzgören *et al.* (2007) analyse factors that predict the credit card expenses by using a multiple linear regression model. Oduncu *et al.* (2013) analyse the impact of new policy mix of the Central Bank of Turkey (CBT) on the credit growth volatility from a financial stability perspective. However, to our best knowledge, this paper is the first paper that thoroughly analyse the consumer loan and credit card growth in emerging market countries including Turkey by employing all these econometric techniques and suggest policy tools in managing the growth.

The outline of the paper is as follows: Section 2 describes the methodology and the data. Section 3 reports the empirical results. Section 4 provides a summary and some suggestions for the use of empirical results.

2. Methodology and Data Description

Key stages of the methodology we use in this study are an extended version of the basic steps of Toda and Yamamoto (1995). For the purposes of the study we include additional steps to the T-Y procedure. Initially, we test for stationarity to determine the order of integration of each variable, *n*, as the models we employ often require stationary time series. For this purpose, we first test for the availability of a structural break in the data. Then, we test for non-stationarity (i.e. unit root). We employ three different unit root tests: Augmented Dickey Fuller (ADF) Test, Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test and Perron's (2006) unit root test in case of a structural break in the data. Second, we explore the long-term relationship between CLCC and the macroeconomic variables by employing two different set of methods/models: single equation cointegrating regression models based on the two-step estimation method of Engle and Granger (1987) and Autoregressive Distributed Lag (ARDL) model of Peseran and Shin (1999). Third, we explore causality relationships between CLCC and the variables implied by the data by employing the most renowned causality test proposed by Granger (1969). For this purpose, we utilize the Toda and Yamamoto (1995) procedure. Fourth, we search for the magnitude, direction and duration of a future response of CLCC to some unit shocks (impulses) in the macroeconomic variables. Last, we explore how much of a change in a variable is due to its own shock and how much due to shocks to other variables by using forecast error variance decomposition (VD).

We use monthly data of the dependent variable CLCC and seven macroeconomic variables that are theoretically related to CLCC. In model estimations and analysis, we use the data that covers the period of January 2004–December 2013. All data are used in logarithmic base. The names of the variables and their abbreviations used in this article are presented in Table 1.

(Table 1 here)

CLCC data is derived from statistics on deposit and participation banks' consumer loans and credit cards published by Central Bank of Turkey (CBRT). Consumer loans represent loans in the form of personal mortgages, vehicle purchases and other consumer credit purchases, and credit cards represent loans in the form of personal credit. Since the current practice of the banks are significantly similar to each other, and as the data is not bank-level data but collected and aggregated by CBRT, we do not consider the heterogeneity as a concern.

GDP data is published by TURKSTAT on quarterly basis and in nominal amounts. We transform the data into monthly base by assuming equal growth in each month of a quarter. Deposit interest rates collected by CBRT are the averages of interest rates weighted in terms of amounts of deposits in each time period. BIST100 index is a return index calculated by using the closing prices and provided by Borsa Istanbul. M2 is the broad definition of money supply. We use the new definition of M2 from 2005 onwards. For the year 2004 we adjust the discontinued series of the M2Y money supply for the new definition of M2. For the period of 2004-2012 we use monthly discontinued Consumer Confidence Index (CCI) published by CBRT. We extend the discontinued series for the year 2013 by using the changes in the new series. For Consumer Price Index (CPI), we take the current 2003=100 series published by TURKSTAT.

We provide descriptive statistics of the data set in Table 2. The data exhibits positive skewness, excess kurtosis, hence as Jarque-Bera statistics also confirms, significantly rejects the null of normality except CCI.

(Table 2 here)

3. Empirical Findings

3.1. Stationary Tests

We first test the log of variables for one or more unknown structural breakpoints in the sample. We employ Quandt-Andrews test that is that a single Chow Breakpoint Test is performed at every observation between two dates. The LR and Wald test statistics from those Chow tests are then summarized into one test statistic (maximum, expectation and average) for a test

against the null hypothesis of no breakpoints between the chosen dates. The estimated statistics are provided in Table 3. All summary statistics for each series significantly reject the null hypothesis and confirm the existence of structural breaks in the data.

(Table 3 here)

In order to consider the breakpoints in the models as a break dummy, we need to determine the date of each breakpoint. Following Bai (1997), we employ the Multiple Breakpoint Test and test for breaks in all recursively determined partitions. The number and dates of structural breaks detected in each series are reported in Table 4.

(Table 4 here)

Second, we test the variables for (level- and trend-) stationarity to determine their order of integration, *n*. For this purpose, we employ three different unit root tests: Augmented Dickey Fuller (ADF) Test where null is non-stationarity (i.e. unit root), KPSS test where null is stationarity (i.e. no unit root), and Perron's (2006) unit root test in case of a structural break in the data where null is non-stationarity (i.e. unit root). In the tests, we allow for a drift and trend to test for level and trend stationarity. In the ADF test with the structural break, we assume that the break does not occur just a single point in time, instead there is a change in the level and trend of the data that evolves over several periods.

(Table 5 here)

Table 5 exhibits test results. From the ADF test, we cannot reject the null of non-stationarity (i.e. unit root) for the levels of variables: DIR, BIST, M2 and CCI, hence they are I(1). However, we can reject the null of unit root for the levels of CLCC, IMP, GDP and CPI at 5 percent significance level. Taking the difference of the I(1) variables clears out the non-stationarity. Therefore, maximum order of integration is *n=1*. To cross-check the ADF test results, we use KPSS test where the null is (level and trend-) stationarity. KPSS test results exhibit that we cannot reject the null of stationarity for DIR, BIST and IMP, while for other variables we can reject the null hypothesis, hence they exhibit unit root. The ADF and KPSS tests yield somewhat different results as well-addressed in the literature.

As Perron (2006) points out, structural changes and unit roots are closely related, and conventional unit root tests are biased toward a false unit root null when the data are trend stationary with a structural break. In order to capture the effect of a structural break whilst testing for stationarity, we employ an ADF test with structural breaks following Perron (2006). Test results suggest that we can reject the null of a unit root for the levels of variables GDP, DIR, CPI and IMP, whereas the structural break parameters of trend and intercept for GDP and

CPI, and structural break parameter of intercept for DIR and IMP are statistically significant. First differencing the data makes the series stationary except IMP.

3.2. Cointegration Analysis

3.2.1. OLS based regression models

In the previous section, with a range of unit root and structural break tests, we establish that the data contain unit roots and structural breaks, and the variables are non-stationary time series. Considering these properties, in search for a long-term relationship between CLCC and its determinants, we first estimate single equation cointegrating regression models. In particular, we employ a simple ordinary least squares (OLS) model and two other single equation models based on the two-step estimation method of Engle and Granger (1987): the Dynamic OLS (DOLS) model of Saikkonen (1992) and Stock and Watson (1993), and the Fully Modified OLS (FMOLS) method of Phillips and Hansen (1992). We also conduct single-equation residual-based cointegration tests. To test for the null hypothesis of series are not cointegrated we employ Engle and Granger (1987) and Phillips and Ouliaris (1990) cointegration tests. Along with the cointegrating macroeconomic variables, we also consider a constant, a linear trend variable and the structural break dummy variable of each cointegrating variable.

The long-run coefficient estimates and cointegration test results of each estimation method are presented in Table 6. The coefficient t-test results suggest statistically significant long-term relationship between CLCC and GDP, M2, IMP and lagged CLCC for the simple OLS model while between CLCC and GDP, BIST, M2 and CCI for the DOLS and FMOLS models. We also test the residual of each model for the null hypothesis of series are not cointegrated. The Engle-Granger and Phillips-Ouliaris test results suggest that we can reject the null of no-cointegration only for the simple OLS model.

(Table 6 here)

3.2.2. Autoregressive Distributed Lag (ARDL) Methodology

In exploring the long-term relationships between variables, as an alternative to the OLS regression analysis, we employ ARDL models. ARDL methodology is invalidated by variables with a degree of integration I(2) or higher. With a range of unit root tests we establish that none of the series we work with are I(2). Following the steps mentioned in the Methodology, we provide the estimated coefficients that represent long-run equilibrating relationship between the variables. In search for a cointegrating relationship between CLCC and the selected variables, we estimate over 5 million alternative model formulations and present the results of the models chosen by AIC, SIC, HQ and AdjR2 criterion. We only provide long-run coefficients. Estimates

of the VECM of each model that represents short-term dynamics are available upon request from the authors.

The estimation results are presented in Table 7. The coefficient t-test results suggest statistically significant long-term relationship between CLCC and BIST and IMP while a strong relationship between CLCC and GDP and DIR.

(Table 7 here)

3.3. Causality Analysis

We explore statistical causality relationships between the macroeconomic variables. We employ Granger Causality Test by following the Toda and Yamamoto (1995) procedure. Initially, we set up a VAR model[3] on which some of our further analysis to be based. The VAR model is in the levels of the data, and includes structural break dummy variables as exogenous variables.

We build our causality analysis on the VAR model specified in this section. Granger Test results are presented in Table 8 and the Causality Flow Chart that is prepared based on the test results is exhibited in Figure 1.

(Table 8 here)

(Figure 1 here)

The causality test results and the causality flow between variables suggest that there is a statistically significant one-way causal relationship between CLCC and BIST, GDP and IMP while a fairly strong relationship between CLCC and DIR. Among the macroeconomic variables considered, CLCC is significantly determined by the income level (GDP) and the yields and the mood in the stock market (BIST) that is mostly considered as a good proxy of economic expectations for the future. The level of CLCC is meaningfully determined by the level of consumer interest rates (proxied by DIR). Meanwhile, the level of consumer confidence (CCI) determines the level of CLCC indirectly via income level (GDP), economic expectations

[3] We first specify the VAR model. To do so, we first determine the appropriate maximum lag length, p, of the autoregressive parts of the VAR model by using a number of information criteria including AIC, SBC, HQ, LR and FPE. All information criteria except SBC, suggest that the maximum lag number should be k=8. We then examine the residuals and apply the LM test for serial independence for up to 12 lags. The test results (test statistics 62.56 with pval 0.53) suggest that the serial correlation is removed (at least at the 5% significance level) if we increase the maximum lag length to p=9. We also test for the dynamic stability of the estimated model by checking the inverse roots of AR characteristic polynomial. The results suggest that the estimated model is also dynamically stable.

(BIST) and the cost of financing the consumer spending (DIR). Higher disposable income, lower consumer loan interest rates and optimistic economic expectations support the expansion of consumer loans and credit card spending. This causal relationships suggested by the data are also in line with theoretical expectations.

Money supply (M2) as a tool and a proxy of monetary policy is jointly determined by the proxies of economic growth (GDP), economic expectations (BIST), interest rates (DIR), consumer inflation (CPI) and imports of consumer goods (IMP). This causal relationships suggest that the Central Bank considers all these variables in using the money supply as a monetary policy tool. While money supply (M2) is among the determinants of the imports of consumer goods, the level of consumer imports (IMP) is jointly determined by the income level (GDP), available financing (CLCC) and the cost of financing (DIR) for the spending on imported goods and the consumers' confidence for the economy (CCI).

Economic theory suggests that money supply as a monetary policy tool should be effective on the CLCC via interest rates. However, the causality analysis finds that there is only a one-way statistically significant relationship between interest rates (DIR) and money supply (M2) (that is from DIR to M2, not vice versa as suggested by the theory). Therefore, M2 may have an indirect influence on CLCC via IMP and DIR.

Therefore, as causality analysis suggests that the main determinants of CLCC are income level, economic expectations and interest rates, we have established that monetary policy tools (money supply as its current form) may not be an effective tool in controlling or if necessary, curbing the growth in CLCC.

3.4. Impulse Response Analysis

To better understand the future response of a target variable to certain shocks in the policy variables we make impulse-response (IR) and variance decomposition (VD) analysis on the VAR model that is set up for the Granger causality analysis.

In search for Cholesky ordering of the variables, in addition to the priori information, we utilize the results of cointegration analysis and causality testing. In search for causality relationships, as stated in the previous section, we have found that money supply (M2), CLCC and import of consumer goods (IMP) are determined jointly by other variables. CLCC has direct causality relationship with the income level (GDP), expectations for the future (BIST), the level of consumer interest rates (DIR) and import of consumer goods (IMP). Meanwhile, these variables also jointly determine money supply. Following Darnell and Evans, (1990:122), we use the

following ordering (from more exogenous to less endogenous variables): CPI, GDP, DIR, BIST100, IMP, CCI, M2 and CLCC.

In order to analyse the 24-monthly marginal responses of CLCC to 1 Cholesky standard deviation innovation in other variables, we estimate IRF exhibited in Figure 2. The IRF estimates suggest following findings: CLCC exhibits a delayed positive response to a positive shock in income (GDP), consumer confidence (CCI), consumer inflation (CPI) and money supply (M2), while an immediate positive response to optimistic economic expectations and a negative response to increase in deposit interest rates (DIR). These results are consistent with the theoretical expectations set above. The impulse-response results for other variables are available in the working paper version Mazibas and Tuna (2015).

3.5. Variance Decomposition Analysis

We investigate how much of a change in a variable is due to its own shock and how much due to shocks to other variables. To do so, we make VD analysis and utilize the same Cholesky ordering we use for IR analysis, and we find the variables, which have effects on the variance of 24-monthly forecast errors.

We report the result of the analysis in Table 9. The VD analysis suggests following findings:

- Most of the variance in the CLCC is explained by the shocks in economic expectations (BIST), interest rates (DIR), money supply (M2) and the CLCC itself in a decreasing order.
- Variances of the most influential factors on CLCC, namely GDP, BIST and DIR, are mostly explained by the lagged values of each factor itself along with the variances of other two of these variables. In particular, along with their lagged values, a significant part of the variance of income (GDP) is explained by economic expectations (BIST), monetary policy (M2) and interest rates (DIR), while the variance of economic expectations (BIST) are explained by shocks in the income, monetary policy and interest rates. Similarly, a significant part of the variance of interest rates is explained by the shocks in economic expectations, income level and monetary policy.
- Monetary policy (M2) explains some parts of the variance of interest rates (DIR), economic expectations (BIST), consumer confidence (CCI) and consumer imports (IMP). In turn, along with its lagged values, the variance of the monetary policy is increasingly explained by the shocks in interest rates (DIR), economic expectations (BIST) and income (GDP).

- Variance of the consumer confidence is explained by the shocks in monetary policy, consumer inflation, economic expectations and income.

In the VD analysis, in line with causality and IR analysis, the variance of CLCC is mostly explained by the shocks in income, economic expectations, interest rates and monetary policy. Therefore, we conclude that these variables are significant in predicting the growth in CLCC. The decomposition results for other variables are available in the working paper version Mazibas and Tuna (2015).

4. Conclusion

The recent growth in consumer loans and credit cards (CLCC) and resulting surge in the indebtedness of households have called for a thorough understanding of the factors behind it and for identifying the toolkit for the control/management of the growth. In this article, we aim to develop an understanding of the recent growth in CLCC, investigate the dynamics of the relationships with other macroeconomic variables and how these variables can be used in predicting the growth in CLCC. To do so, we search for short-term, long-term and causal relationships between CLCC and chosen macroeconomic variables, and explore the post-sample predictability and behaviour of CLCC to certain shocks in the macroeconomic variables. Our purpose is to make suggestions on which policy tools are at the disposal of the policy makers.

We have found that as cointegration analyses confirm, CLCC has robust long-term equilibrium relationships with the chosen variables. In addition to equilibrium relations, by capturing the short-term deviations from the equilibrium, robust predictions of the growth in CLCC can be made.

As causality analyses suggest, CLCC is mostly determined by the income level (GDP), the yields and the mood in the stock market (BIST) and interest rates (DIR). That means the level and growth in CLCC is mostly determined by the level and growth in the income level, economic expectations for the future and the level of interest rates. Among these factors, income level also influences the consumers' confidence (CCI) and the demand for consumer goods (IMP). These three primary factors along with consumer inflation (CPI) and the demand for consumer goods (IMP) also essentially influence the monetary policy tools. Money supply (M2) as the monetary policy tool does not have a significant direct influence on CLCC. On the other hand, we have empirically proven that the central bank's monetary policy in this period is mostly determined by the factors of income, economic expectations, consumer confidence, level of consumer interest rates, demand for import of consumer goods and consumer inflation,

altogether. Although in theory and in practice the level of deposit and consumer loans interest rates are mainly determined by benchmarking the money market interest rates that is mostly influenced from the monetary policy of the central bank, we have only found a statistically significant one-way relationship (from DIR to M2) between interest rates and money supply. Therefore, we have established during the analysis period the money supply is mostly reactive and determined by other variables, while current mood and future expectations in the economy significantly determine the growth in CLCC.

In line with above findings, post-sample analyses suggest that CLCC exhibits a delayed positive response to a positive shock in income, consumer confidence, consumer inflation and money supply, while an immediate positive response to optimistic economic expectations and a negative response to increase in interest rates. These results are consistent with the theoretical expectations set above.

We conclude that the money supply as a monetary policy tool, in its present form, may not be an effective tool in controlling or if necessary, curbing the growth in CLCC. Instead, some regulatory measures may prove more effective. We also conclude that stock market, income, interest rates, consumer confidence and demand for consumer goods can be used in predicting the growth in CLCC.

Bibliography

[1] Bai, J. (1997), "Estimating Multiple Breaks One at a Time," *Econometric Theory*, 13, 315–352.

[2] Barba, A. and Pivetti, M. (2009), "Rising household debt: Its causes and macroeconomic implications-a long-period analysis", *Cambridge Journal of Economics*, 33 (1), 113–137.

[3] Bertola G., Disney, R. and Grant, C. (2006), "Consumer Credit", (Eds. Bertola G., Disney, R. and Grant) in the Economics of Consumer Credit, MIT Press.

[4] Central Bank of the Republic of Turkey (CBRT) Electronic Data Delivery System http://evds.tcmb.gov.tr/yeni/cbt-uk.html, accessed on April 20th, 2014.

[5] Darnell, A. C. and Evans, J. L. (1990), *The Limits of Econometrics*, Edward Elgar, Aldershot.

[6] Debelle, G. (2004), "Macroeconomic Implications of Rising Household Debt", BIS Working Paper, no. 153.

[7] Delgadillo, L.M., Erickson, L.V., Piercy, K.W. (2008), "Disentangling the Differences between Abusive and Predatory Lending: Professionals' Perspectives", *The Journal of Consumer Affairs* 42 (3), 313–333.

[8] Duesenberry, J. (1949), *Income, Saving, and the Theory of Consumption Behavior*. Harvard University Press, Cambridge, Mass.

[9] Dynan, K.E. and Kohn, D.L. (2007), "The Rise in US Household Indebtedness: Causes and Consequences", Federal Reserve Finance and Economics Discussion Series 2007–37.

[10] Engle, R. F., and Granger, C. W. J. (1987), "Co-Integration and Error Correction: Representation, Estimation and Testing". *Econometrica*, 55, 251–276.

[11] Friedman, M. (1957), *A Theory of the Consumption Function*. Princeton University Press, Princeton.

[12] Granger, C. W. J. (1969), "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," *Econometrica*, 37, 424–438.

[13] İbicioğlu, M. and M.B. Karan (2012), "The Factors Affecting of Demand for Housing Credit: Evidence from Turkey", *Ekonomi Bilimleri Dergisi*, 4 (1), 65–75.

[14] Johansen, S. (1988), "Statistical Analysis of Cointegration Vectors," *Journal of Economic Dynamics and Control*, Elsevier, vol. 12(2-3), 231–254.

[15] Johansen, S. (1991), "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models" *Econometrica*, Vol. 59, No. 6 (Nov., 1991), 1551–1580.

[16] Johansen, S. (1992), "Testing Weak Exogeneity and the Order of Cointegration in UK Money Demand Data", *Journal of Policy Modelling*, 14, 3, 313–334.

[17] Kwiatkowski, D., Phillips, P. C. B., Schmidt, P. and Shin, Y. (1992). "Testing the Null Hypothesis of Stationary against the Alternative of a Unit Root," *Journal of Econometrics*, 54, 159–178.

[18] Mazibas, M. and Tuna, Y. (2015), "Consumer Loans and Credit Cards in an Emerging Market: Econometric Modelling and Policy Implications for Turkey", SSRN Working Paper.

[19] Modigliani, F. and Brumberg, R. (1954), "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data", in K. Kurihara, (ed.), *Post Keynesian Economics*, Rutgers University Press, New Brunswick, NJ.

[20] Oduncu, A., Ermişoğlu, E., Polat, T. (2013), "The Effect of CBRT's New Policy Mix on the Volatility of Credit Growth", CBT Research Notes in Economics.

[21] Perron, P. (2006), "Dealing with Structural Breaks," in *Palgrave Handbook of Econometrics, Vol. 1:Econometric Theory*, T. C. Mills and K. Patterson (*eds.*). New York: Palgrave Macmillan.

[22] Pesaran, M. H. and Shin, Y. (1999), "An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis". Chapter 11 in S. Strom (ed.), *Econometrics and Economic Theory in the*

20th Century: The Ragnar Frisch Centennial Symposium. Cambridge University Press, Cambridge. (Discussion Paper version)

[23] Pesaran, M. H., Shin, Y. and Smith, R. J. (2001), "Bounds Testing Approaches to the Analysis of Level Relationships". *Journal of Applied Econometrics*, 16, 289–326.

[24] Phillips, P. C. B. and Hansen, B. E. (1990), "Statistical Inference in Instrumental Variables Regression with I(1) Processes". *Review of Economics Studies*, 57, 99–125.

[25] Phillips, P. C. B. and Ouliaris S. (1990), "Asymptotic Properties of Residual Based Tests for Cointegration", *Econometrica*, 58 (1), 165–193.

[26] Saikkonen, P. (1992). "Estimation and Testing Of Cointegrated Systems by an Autoregressive Approximation". *Econometric Theory*, 8, 1–27.

[27] Stock, J. H. and Watson, M. (1993), "A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems". *Econometrica*, 61, 783–820.

[28] Toda, H. Y. and Yamamoto, T. (1995), "Statistical Inferences in Vector Autoregressions with Possibly Integrated Processes", *Journal of Econometrics*, 66, 225–250.

[29] Turkish Statistical Institute (TURKSTAT) http://www.turkstat.gov.tr, accessed on April 20th, 2014.

[30] Tsay, R.S (2005), *Analysis of Financial Times Series*, Second Edition, John Wiley & Sons, New Jersey, USA.

[31] Uzgören, N., Ceylan, G., and Uzgören, E. (2007), "A Model Study Based on Setting The Factors Affecting The Credit Card Usage in Turkey", *Yönetim ve Ekonomi*, Celal Bayar University, 14(2), 247–256.

Table 1: Variables Used in Analysis

Variable	Abbreviations
Consumer loans and personal credit cards (thousand TL), (CBRT)	CLCC
Gross Domestic Product (thousand TL), (TURKSTAT)	GNP
1 year time deposit interest rate (%), (CBRT)	DIR
BIST100 Composite Return Index (Borsa Istanbul)	BIST
Broad Money Supply (defined as M2), (thousand YTL), (CBRT)	M2
Consumer Goods Imports (thousand USD), (TURKSTAT)	IMP
Consumer Confidence Index (CBRT)	CCI
Consumer price index (2003=100), (TURKSTAT)	CPI

Table 2: Descriptive Statistics

	CLCC	GDP	DIR	BIST	M2	IMP	CCI	CPI
Mean	131.00	249.00	18.88	62,088	446.00	1.77	91.28	160.67
Median	117.00	233.00	18.29	56,870	436.00	1.71	91.40	160.44
Maximum	330.00	414.00	28.59	128,115	909.00	2.96	111.90	229.01
Minimum	12.86	120.00	12.01	19,714	151.00	0.62	68.90	104.12
Std. Deviation	88.79	81.11	3.75	27,178	212.00	0.57	9.30	36.85
Skewness	0.58	0.33	0.24	0.31	0.35	0.16	-0.01	0.18
Kurtosis	2.26	2.05	1.90	2.17	1.97	2.08	2.84	1.85
No of Observation	121	121	121	121	121	121	121	121
Jarque-Bera	9.59	6.78	7.24	5.43	7.76	4.75	0.13	7.33
p value	0.01	0.03	0.03	0.07	0.02	0.09	0.94	0.03

Notes: CLCC, GDP, M2 are in billion TRL, IMP is in billion USD.

Table 3: Testing for Structural Breakpoints

	Max. LR F-statistic	Max. Wald F-statistic	Exp LR F-statistic	Exp Wald F-statistic	Ave LR F-statistic	Ave Wald F-statistic
CLCC	288.80 (0.00)	288.80 (0.00)	141.31 (0.00)	141.31 (0.00)	190.03 (0.00)	190.03 (0.00)
GDP	245.61 (0.00)	245.61 (0.00)	119.03 (0.00)	119.03 (0.00)	186.74 (0.00)	186.74 (0.00)
DIR	469.87 (0.00)	469.87 (0.00)	230.78 (0.00)	230.78 (0.00)	131.18 (0.00)	131.18 (0.00)
BIST	211.37 (0.00)	211.37 (0.00)	101.94 (0.00)	101.94 (0.00)	120.45 (0.00)	120.45 (0.00)
M2	351.74 (0.00)	351.74 (0.00)	172.77 (0.00)	172.77 (0.00)	222.45 (0.00)	222.45 (0.00)
IMP	183.07 (0.00)	183.07 (0.00)	88.06 (0.00)	88.06 (0.00)	119.45 (0.00)	119.45 (0.00)
CCI	125.75 (0.00)	125.75 (0.00)	59.65 (0.00)	59.65 (0.00)	49.93 (0.00)	49.93 (0.00)
CPI	359.92 (0.00)	359.92 (0.00)	176.33 (0.00)	176.33 (0.00)	225.83 (0.00)	225.83 (0.00)

Notes: The null hypothesis is no breakpoints within 15% trimmed data. Probabilities are in the paranthesis and calculated using Hansen's (1997) method.

Table 4: Numbers and dates of Structural Breakpoints

	Dates of Breaks							
Break Number	**CLCC**	**GDP**	**DIR**	**BIST**	**M2**	**IMP**	**CCI**	**CPI**
1	2005M07	2005M08	2009M02	2005M09	2005M12	2005M08	2006M06	2006M04
2	2007M06	2007M12	2010M08	2008M02	2008M03	2007M05	2008M03	2008M02
3	2009M06	2009M09	2012M02	2009M08	2010M06	2010M07	2010M03	2009M12
4	2010M12	2011M06		2012M07	2012M07		2012M07	2011M11
5	2012M07							

Notes: Bai (1997) Multiple Breakpoint Test that test for breaks in all recursively determined partitions and allow heterogeneous error distributions across breaks. Trimming is 0.15, Max. breaks 5, significance level is 0.05.

Table 5: Testing for Unit Root

Variables	Augmented Dickey Fuller (ADF) Test				ADF Test with Structural Break				KPSS Test	
	Level		1st difference		Level		1st difference		Level	1st difference
	Test Stats.	p-value	Test Stats.	p-value	Test Stats.	p-value	Test Stats.	p-value	Test Stats.	Test Stats.
CLCC	-4.058	0.01	-5.636	0	-2.967	0.87	-7.086	< 0.01	0.275***	0.233***
GDP	-3.247	0.08	-3.237	0.08	-6.268	< 0.01	-5.869	< 0.01	0.126**	0.029
DIR	-2.694	0.24	-7.473	0	-5.345	0.03	-7.900	< 0.01	0.106	0.057
BIST	-2.388	0.38	-8.510	0	-1.070	>0.99	-9.364	< 0.01	0.084	0.051
M2	-1.737	0.73	-5.790	0	-2.619	0.93	-12.690	< 0.01	0.287***	0.058
IMP	-4.428	0.00	-3.219	0.09	-4.840	0.10	-3.258	0.79	0.085	0.213**
CCI	-2.264	0.45	-8.730	0	-4.598	0.18	-9.521	< 0.01	0.237***	0.052
CPI	-3.807	0.02	-7.954	0	-5.933	< 0.01	-8.094	< 0.01	0.259***	0.189**

Notes: (1) ADF test p-values are MacKinnon (1996) one-sided p-values. Unit root break test p-values are Vogelsang (1993) asymptotic one-sided p-values. KPSS test critical values are from Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1). **(2)** For the KPSS test, * rejects the null hypothesis of a stationarity at the 10% significance level, ** rejects the null hypothesis of stationarity at the 5% significance level, *** rejects the null hypothesis of stationarity at the 1% significance level.

Table 6: Long-run coefficient estimates and cointegration test results of OLS based models of CLCC

	OLS		DOLS		FMOLS	
Indep. Variables:	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
CLCC (-1)	1.088	0.000				
CLCC (-2)	-0.10	0.305				
GDP	0.08	0.001	1.12	0.003	0.78	0.002
DIR	0.01	0.292	0.06	0.653	0.08	0.561
BIST	-0.01	0.175	0.28	0.001	0.30	0.000
M2	0.13	0.000	1.44	0.000	1.53	0.000
IMP	-0.03	0.000	-0.09	0.572	-0.04	0.655
CCI	-0.04	0.124	-0.74	0.011	-0.65	0.007
CPI	-0.05	0.667	0.00	0.999	0.70	0.589
C	-3.16	0.001	-29.58	0.020	-29.71	0.002
Trend	0.00	0.072	-0.01	0.357	-0.02	0.096
SBD-CLCC	0.01	0.273	0.02	0.779	0.04	0.524
SBD-GDP	0.01	0.224	0.02	0.750	0.01	0.900
SBD-DIR	0.00	0.900	0.03	0.658	0.03	0.721
SBD-BIST	0.00	0.888	0.03	0.621	-0.01	0.858
SBD-M2	0.00	0.952	-0.01	0.842	0.01	0.939
SBD-IMP	0.00	0.631	-0.01	0.871	-0.03	0.675
SBD-CCI	0.00	0.608	-0.02	0.737	-0.03	0.698
SBD-CPI	-0.01	0.275	0.02	0.719	0.07	0.277
Engle-Granger test	-11.18	0.000	-4.51	0.403	-4.51	0.403
Phillips-Ouliaris test	-11.22	0.000	-4.72	0.304	-4.72	0.304

Notes: Single equation cointegrating regression models based on following estimation methods are estimated: a simple ordinary least squares (OLS) model, Dynamic OLS (DOLS) model and Fully Modified OLS (FMOLS) method. As the regressor along with the cointegrating variables GDP, DIR, BIST, M2, IMP, CCI and CPI, a constant, a linear trend variable and structural break dummy variables of each cointegrating variable are also considered. Estimated coefficients and the p-values of each coefficients are provided in the table. Single-equation residual-based cointegration tests are also conducted. The null hypothesis that the series are not cointegrated is tested by employing Engle and Granger (1987) and Phillips and Ouliaris (1990) cointegration tests. The tau test statistics and p-values of each statistics are also provided in the table.

Table 7: Long-run Cointegration Coefficient Estimates of Selected ARDL models of CLCC

	AIC		SIC		HQ		Adj R2	
Indep. Variables:	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
GDP	1.25	0.166	-48.53	0.923	-1.53	0.505	1.25	0.166
DIR	-0.31	0.171	-6.35	0.926	-0.58	0.443	-0.31	0.171
BIST	0.23	0.029	8.34	0.921	0.77	0.133	0.23	0.029
M2	-1.39	0.281	-66.41	0.924	-3.71	0.366	-1.39	0.281
IMP	0.84	0.063	25.76	0.922	1.86	0.195	0.84	0.063
CCI	0.07	0.894	15.40	0.924	0.75	0.562	0.07	0.894
CPI	3.14	0.226	35.93	0.923	2.04	0.697	3.14	0.226
C	-7.41	0.753	1545.50	0.924	72.95	0.393	-7.41	0.753
Trend	-0.01	0.686	0.71	0.924	0.04	0.451	-0.01	0.686
SBD-CLCC	0.02	0.801	0.96	0.924	0.05	0.818	0.02	0.801
SBD-GDP	0.06	0.409	1.02	0.923	-0.04	0.864	0.06	0.409
SBD-DIR	0.02	0.866	-2.89	0.924	-0.17	0.549	0.02	0.866
SBD-BIST	0.05	0.498	-0.37	0.939	0.08	0.712	0.05	0.498
SBD-M2	-0.16	0.134	-3.96	0.923	-0.33	0.335	-0.16	0.134
SBD-IMP	-0.04	0.630	4.74	0.923	0.25	0.417	-0.04	0.630
SBD-CCI	-0.15	0.217	-5.89	0.923	-0.51	0.261	-0.15	0.217
SBD-CPI	-0.01	0.946	-3.51	0.923	-0.17	0.559	-0.01	0.946

Notes: The ARDL models for CLCC are estimated with a constant, linear trend and structural break dummies specification. Dynamic regressors are allowed to have maximum 6 lagged values. Over 5 million models, AIC, SIC, HQ and AdjR2 criteria are used in selecting the best model. The selected model of each criterion are as follows: AIC: ARDL(5, 6, 6, 3, 6, 0, 6, 0), SC: ARDL(6, 1, 0, 0, 1, 0, 0, 0), HQ: ARDL(6, 3, 5, 0, 1, 0, 4, 0), AdjR2: ARDL(5, 6, 6, 3, 6, 0, 6, 0).

Table 8: Granger Test Results

	Test Stats	**p-value**		**Test Stats**	**p-value**		**Test Stats**	**p-value**		**Test Stats**	**p-value**
Dependent Variable: CLCC			**Dependent Variable: DIR**			**Dependent Variable: M2**			**Dependent Variable: CCI**		
GDP	18.49	0.018	**CLCC**	7.39	0.496	**CLCC**	12.75	0.121	**CLCC**	7.89	0.445
DIR	12.95	0.113	**GDP**	6.50	0.591	**GDP**	28.11	0.001	**GDP**	14.00	0.082
BIST	14.34	0.073	**BIST**	4.64	0.796	**DIR**	17.90	0.022	**DIR**	6.85	0.553
M2	5.67	0.684	**M2**	6.61	0.579	**BIST**	14.57	0.068	**BIST**	11.71	0.165
IMP	10.46	0.234	**IMP**	17.71	0.024	**IMP**	13.95	0.083	**M2**	8.87	0.353
CCI	3.95	0.862	**CCI**	5.17	0.739	**CCI**	12.28	0.139	**IMP**	17.50	0.025
CPI	8.87	0.353	**CPI**	4.26	0.833	**CPI**	31.70	0.000	**CPI**	6.33	0.610
Dependent Variable: GDP			**Dependent Variable: BIST**			**Dependent Variable: IMP**			**Dependent Variable: CPI**		
CLCC	4.47	0.812	**CLCC**	4.21	0.838	**CLCC**	16.83	0.032	**CLCC**	4.65	0.794
DIR	12.66	0.124	**GDP**	10.55	0.228	**GDP**	77.04	0.000	**GDP**	11.12	0.195
BIST	8.04	0.430	**DIR**	5.55	0.697	**DIR**	28.64	0.000	**DIR**	11.68	0.166
M2	11.91	0.155	**M2**	11.59	0.170	**BIST**	12.82	0.118	**BIST**	6.86	0.552
IMP	5.13	0.744	**IMP**	10.65	0.222	**M2**	17.05	0.030	**M2**	4.31	0.828
CCI	17.89	0.022	**CCI**	18.32	0.019	**CCI**	16.49	0.036	**IMP**	4.76	0.783
CPI	9.07	0.337	**CPI**	9.04	0.339	**CPI**	9.92	0.271	**CCI**	9.40	0.309

Notes: Test results of Granger Causality/Block Exogeneity Wald Test. Test statistics are Chi-square statistics. Causality relationships are found by following the Toda and Yamamoto (1995) procedure. The null is "A does not Granger cause B".

Figure 1: Causality Flow Chart

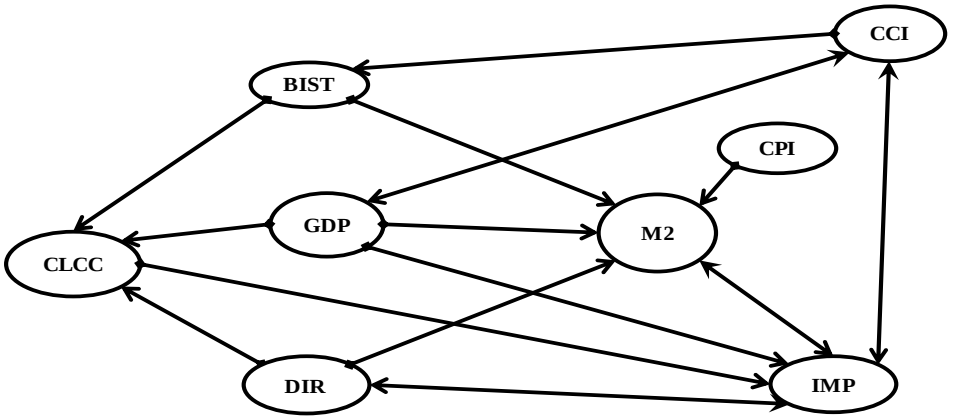

Table 9: Variance Decomposition of CLCC

Period	S.E.	CPI	GDP	DIR	BIST	IMP	CCI	M2	CLCC
1	0.01	4.11	0.75	13.48	3.76	12.18	2.30	26.83	36.60
2	0.01	6.37	1.92	12.06	17.88	5.99	1.19	19.36	35.23
3	0.01	6.64	1.31	12.51	32.58	3.99	1.24	12.92	28.80
4	0.02	4.30	1.01	13.38	46.41	3.51	1.21	9.08	21.10
5	0.02	3.15	1.82	12.96	53.27	3.41	0.83	8.42	16.14
6	0.02	3.18	2.81	13.36	56.30	3.53	0.63	7.15	13.04
7	0.03	2.57	3.59	12.88	60.14	4.16	0.47	5.96	10.23
8	0.03	2.14	4.38	12.48	61.29	4.26	0.54	6.32	8.59
9	0.03	1.77	4.95	14.15	60.44	4.39	0.74	6.41	7.15
10	0.04	1.69	5.04	16.91	57.17	4.75	1.05	7.29	6.10
11	0.04	1.69	5.57	19.72	52.46	4.34	1.25	9.57	5.40
12	0.04	1.78	6.30	20.02	47.82	3.91	1.83	13.01	5.33
13	0.04	2.41	6.10	18.94	42.65	3.54	4.20	16.48	5.69
14	0.05	4.18	5.24	16.27	39.87	3.42	7.12	17.43	6.48
15	0.05	6.69	4.22	13.20	40.11	3.46	9.16	15.53	7.63
16	0.06	7.94	3.89	11.20	42.70	3.37	9.53	13.04	8.34
17	0.07	8.53	4.27	9.80	46.08	4.04	8.73	10.21	8.33
18	0.08	8.89	5.15	9.12	49.54	4.71	7.54	7.49	7.57
19	0.09	8.88	6.34	8.48	52.35	5.43	6.24	5.65	6.63
20	0.11	8.37	7.42	8.67	53.64	6.36	4.99	4.70	5.85
21	0.12	7.35	9.04	9.52	53.73	6.60	3.93	4.63	5.18
22	0.14	6.49	10.65	10.04	53.53	6.37	3.12	5.41	4.40
23	0.15	5.71	11.75	10.47	52.79	6.30	2.56	6.71	3.71
24	0.17	5.01	12.53	10.81	51.54	6.19	2.29	8.43	3.20

Notes: Table exhibits the decomposition of the variance in CLCC as percentages in each period.

Figure 2: Responses of CLCC to 1 Cholesky Standard Deviation Innovation in other variables